

The Gastrointestinal Tract

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235. A 4-year-old boy presents with a history of constipation since the age of 6 months. His stools, produced every 3 to 4 days, are described as large and hard. Physical examination is normal; rectal examination reveals a large ampulla, poor sphincter tone but present anal wink, and stool in the rectal vault. The plain film of his abdomen is shown. Which of the following is the most appropriate next step in the management of this child?



(Courtesy of Susan John, MD.)

The radiograph demonstrates a stool-filled megacolon. Finding a dilated, stool-filled anal canal with poor tone on the physical examination of a well-grown child supports the diagnosis of functional constipation.

- a. Lower gastrointestinal (GI) barium study
- b. Parental reassurance and dietary counseling**
- c. Serum electrolyte measurement
- d. Upper GI barium study
- e. Initiation of thyroid-replacement hormone



آلام البطن

236. A 10-year-old boy has been having “bellyaches” for about 2 years. They occur at night as well as during the day. Occasionally, he vomits after the onset of pain. Occult blood has been found in his stool. His father also gets frequent, nonspecific stomachaches. Which of the following is the most likely diagnosis?

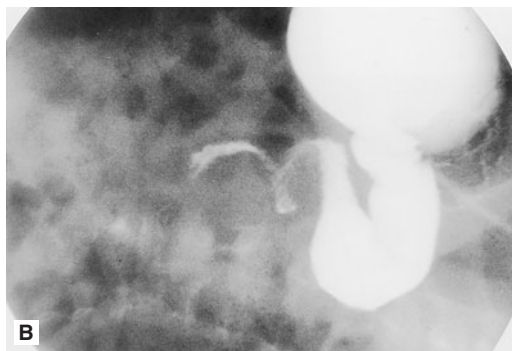
- a. Peptic ulcer
- b. Appendicitis
- c. Meckel diverticulum
- d. Functional abdominal pain
- e. Pinworm infestation

237. An 8-year-old boy presents to your office for a second opinion. He has a 2-year history of intermittent vomiting, dysphagia, and epigastric pain. His father reports he occasionally gets food “stuck” in his throat. He has been on a proton pump inhibitor for 18 months without symptom relief. His past history is significant only for eczema and a peanut allergy. Endoscopy was performed 6 months ago; no erosive lesions were noted and a biopsy was not performed. You arrange for a repeat endoscopy with biopsy. Microscopy on the biopsy sample reveals many eosinophils. Treatment of this condition should include which of the following?

- a. Corticosteroids
- b. Prolonged acid blockade
- c. Treatment for *Candida* sp.
- d. Treatment for *Aspergillus* sp.
- e. Observation

eosinophilic esophagitis continues to evolve, but it appears to be an allergic response. Males are affected more than females.

238. A 1-week-old previously healthy infant presents to the emergency room with the acute onset of bilious vomiting. The abdominal plain film in the emergency department (A) and the barium enema done after admission (B) are shown. Which of the following is the most likely diagnosis for this patient?



(Courtesy of Susan John, MD.)

- a. Jejunal atresia
- b. Hypertrophic pyloric stenosis
- c. Malrotation with volvulus *acute*
- d. Acute appendicitis
- e. Intussusception

239. The newborn nursery calls to notify you that a 1-day-old baby boy has developed abdominal distension and bilious emesis. Prenatal history was significant for areas of echogenic bowel seen on ultrasound. You order an abdominal radiograph; based on the results you order a contrast enema. Both are shown here. This infant is most likely to have which of the following?



(Courtesy of Susan John, MD.)

meconium ileus, a condition virtually pathognomonic for cystic fibrosis (CF).



(Courtesy of Susan John, MD.)

- a. Duodenal atresia
- b. Cystic fibrosis**
- c. Gastroenteritis
- d. Malrotation with volvulus
- e. Hirschsprung disease

240. A 15-year-old girl is admitted to the hospital with a 6-kg weight loss, bloody diarrhea, and fever that have occurred intermittently over the previous 6 months. She reports cramping abdominal pain with bowel movements. She also reports secondary amenorrhea during this time. Stool cultures in her physician's office have shown only normal intestinal flora. A urine pregnancy test was negative, while an erythrocyte sedimentation rate (ESR) was elevated. Her examination is significant for the lack of oral mucosal ulcerations and a normal perianal examination. Anti-*Saccharomyces cerevisiae* antibodies (ASCA) are negative, while anti-neutrophil cytoplasm antibodies (p-ANCA) are positive. You confirm your presumptive diagnosis with a rectal biopsy. In counseling her about her disease, which of the following statements would be true?

ulcerative colitis,

- a. Inheritance is autosomal dominant.
- b. Her risk of colon cancer is minimally elevated over the general population.
- c. Intestinal strictures are common.
- d. The most serious complication of her disease is toxic megacolon.
- e. The intestinal involvement is separated by areas of normal bowel.

241. A 3-year-old child presents to your office for an evaluation of constipation. The mother notes that since birth, and despite frequent use of stool softeners, the child has only about one stool per week. He does not have fecal soiling or diarrhea. He was born at term and without pregnancy complications. The child stayed an extra day in the hospital at birth because he did not pass stool for 48 hours, but has not been in the hospital since. Initial evaluation of this child should include which of the following?

- a. A child psychiatry evaluation for stool retention and parenting assistance
- b. A barium enema and rectal manometry ↪ to exclude pressure
- c. Plain films of the abdomen
- d. Dietary log and observation
- e. Beginning oral antispasmodic medication

Hirschsprung disease should be suspected in a child with intractable chronic constipation without fecal soiling

↪ aganglionic cell.

242. A 4-week-old boy presents with a 10-day history of vomiting that has increased in frequency and forcefulness. The vomit is not bile stained. The child feeds avidly and looks well, but he has been losing weight. An ultrasound of the abdomen is shown. Which of the following is the most likely diagnosis?



- Surgical consultation for pyloromyotomy**
- Upper GI with small-bowel follow through
- Intravenous (IV) fluids alone to maintain hydration
- Air contrast enema
- Computed tomography (CT) of the brain

243. A 17-year-old adolescent female is 6 weeks postpartum. She presents to the emergency room with the complaints of increased jaundice, abdominal pain, nausea, vomiting, and fever. Her examination is remarkable for jaundice, pain of the right upper quadrant with guarding, and a clear chest. Chest radiographs appear normal. Which of the following tests is most likely to reveal the cause of this pain?

- a. Serum chemistries
- b. Complete blood count (CBC) with platelets and differential
- c. **Ultrasound of the right upper quadrant**
- d. Upper GI series
- e. Hepatitis panel

244. An 8-year-old is accidentally hit in the abdomen by a baseball bat. After several minutes of discomfort, he seems to be fine. Over the ensuing 24 hours, however, he develops a fever, abdominal pain radiating to the back, and persistent vomiting. On examination, the child appears quite uncomfortable. The abdomen is tender, with decreased bowel sounds throughout, but especially painful in the midepigastriac region with guarding. Which of the following tests is most likely to confirm the diagnosis?

- a. **Serum amylase levels**
- b. CBC with differential and platelets
- c. Serum total and direct bilirubin levels
- d. Abdominal radiograph
- e. Electrolyte panel

Pancreatitis

245. A 10-month-old baby boy, recently adopted from Guyana, has a 5-hour history of crying, with intermittent drawing up of his knees to his chest. On the way to the emergency room he passes a loose, bloody stool. He has had no vomiting and has refused his bottle since the crying began. Physical examination is noteworthy for an irritable infant whose abdomen is very difficult to examine because of constant crying. His temperature is 38.8°C (101.8°F). The rectal ampulla is empty, but there is some gross blood on the examining finger. Which of the following studies would be most helpful in the immediate management of this patient?

- a. Stool culture
- b. Examination of the stool for ova and parasites
- c. **Air contrast enema**
- d. Examination of the blood smear
- e. Coagulation studies

intussusception is that of an infant between 4 and 10 months

246. A 12-month-old girl has been spitting up her meals since 1 month of age. Her growth is at the 95th percentile, and she is otherwise asymptomatic and without findings on physical examination. Which of the following is the most likely diagnosis?

- a. Pyloric stenosis
- b. Partial duodenal atresia
- c. Hypothyroidism
- d. Gastroesophageal reflux
- e. Tracheoesophageal fistula

247. A 14-year-old girl has a 9-month history of diarrhea, abdominal pain (usually periumbilical and postprandial), fever, and weight loss. She has had several episodes of blood in her stools. Which of the following is the most likely diagnosis?

- a. Chronic appendicitis
- b. Chronic pancreatitis
- c. Crohn disease
- d. Bulimia
- e. Gallstones

248. A 4-year-old boy, recently adopted through an international adoption service, is noted to have intermittent watery diarrhea, nausea, belching, and abdominal pain. His weight is less than the fifth percentile for his age. Which of the following studies would be most helpful in making the diagnosis?

- a. CBC and differential
- b. ESR
- c. Abdominal ultrasound
- d. Liver function studies

Patients with Giardia infection complain of recurrent abdominal pain, cramping, intermittent diarrhea, bloating, and weight loss. Although many cases are self-limited, symptoms can recur or become chronic.

- e. Stool microscopy for ova and parasites

249. A 5-month-old child regularly regurgitates a large portion of her feeds. A pH probe study showed significant periods of low esophageal pH. The child has normal growth and no other significant past medical history. Which of the following is the best management at this point?

- a. Barium swallow and upper GI series
- b. Oral reflux medications
- c. Esophageal manometry
- d. Close observation only
- e. Surgical correction with fundoplication

250. A 2-year-old presents to the emergency center with several days of rectal bleeding. The mother first noticed reddish-colored stools 2 days prior to arrival and has since changed several diapers with just blood. The child is afebrile, alert, and playful, and is eating well without emesis. He is slightly tachycardic, and his abdominal examination is normal. Which of the following is the best diagnostic study to order to confirm the diagnosis?

- a. Exploratory laparotomy
- b. Barium enema
- c. Ultrasound of the abdomen
- d. Radionucleotide scan**
- e. Stool culture

typical presentation for Meckel diverticulum.

251. A 15-year-old otherwise healthy boy presents with a complaint of intermittent abdominal distention, crampy abdominal pain, and excessive flatulence. He first started noticing these symptoms when he moved into his father's house, and his stepmother insisted on milk at dinner every night. He has normal growth, has not lost weight, and has no travel history. Which of the following is the most appropriate study to diagnose his condition?

- a. Barium swallow and upper GI
- b. Hydrogen excretion in breath after oral administration of lactose**
- c. Esophageal manometry
- d. Stool pH after one to 2 weeks of a lactose-free diet
- e. Fasting serum lactose levels

252. A 6-week-old infant is admitted to the hospital with jaundice. Her outpatient blood work demonstrated a total bilirubin of 12 mg/dL with a direct portion of 3.5 mg/dL. Which of the following disorders is most likely to be responsible?

- a. ABO incompatibility
- b. Choledochal cyst**
- c. Rh incompatibility
- d. Gilbert disease
- e. Crigler-Najjar syndrome

253. A 2-year-old arrives in the emergency center after having swallowed a button battery from one of her toys. She is breathing comfortably, without stridor. Radiographs show the battery to be lodged in the esophagus. Which of the following is the correct next step?

- a. Induce emesis with syrup of ipecac.
- b. Admit for observation, and obtain serial radiographs to document movement of the battery.
- c. Discharge home with instructions to monitor the stool for the battery.
- d. Immediate removal of the battery via endoscopy.
- e. Encourage oral intake to assist in passage of the battery.

254. An awake, alert infant with a 2-day history of diarrhea presents with a depressed fontanelle, tachycardia, sunken eyes, and the loss of skin elasticity. Which of the following is the correct percentage of dehydration?

- a. Less than 1%
- b. 1% to 5%
- c. 5% to 9%
- d. 10% to 15%
- e. More than 20%

255. A 9-month-old is brought to the emergency center by ambulance. The child had been having emesis and diarrhea with decreased urine output for several days, and the parents noted that she was hard to wake up this morning. Her weight is 9 kg, down from 11 kg the week prior at her 9-month checkup. You note her heart rate and blood pressure to be normal. She is lethargic, and her skin is noted to be “doughy.” After confirming that her respiratory status is stable, you send electrolytes, which you expect to be abnormal. You start an IV. Which of the following is the best solution for an initial IV bolus?

- a. One-fourth normal saline (38.5 mEq sodium/L)
- b. D10 water (100 g glucose/L)
- c. Normal saline (154 mEq sodium/L)
- d. 3% saline (513 mEq sodium/L)
- e. Fresh-frozen plasma

256. You are admitting to the hospital a 3-month-old infant who has been having poor feeding, emesis, and diarrhea for 3 days. In the emergency center, her electrolytes were found to be: sodium 157 mEq/L, potassium 2.6 mEq/L, chloride 120 mEq/L, bicarbonate 14 mEq/L, creatinine 1.8 mEq/L, blood urea nitrogen (BUN) 68 mEq/L, and glucose 195 mEq/L. She was given a fluid bolus in the emergency center and has subsequently produced urine. Which of the following is the most appropriate next step in her management?

a. Slow rehydration over 48 hours

hypernatremic Dehydration? s/p hyper-reflexia-agitation.

b. Continued rapid volume expansion with $\frac{1}{4}$ normal saline

c. Packed red blood cells (RBCs)

d. Rehydration with free water

e. Urinary electrolytes

To avoid
brain
edema

257. The mother of a 6-month-old infant is concerned that her baby may be teething. You explain to her that the first teeth to erupt in most children are which of the following?

a. Mandibular central incisors

b. Maxillary lateral incisors

c. Maxillary first molars

d. Mandibular cuspids (canines)

e. First premolars (bicuspid)

258. An 8-year-old boy is brought to your office with the complaint of abdominal pain. The pain is worse during the week and seems to be less prominent during the weekends and during the summer. The patient's growth and development are normal. The physical examination is unremarkable. Laboratory screening, including stool for occult blood, CBC, urinalysis, and chemistry panel, yields normal results. Which of the following is the best next step in the care of this patient?

a. Perform an upper GI series

b. Perform CT of the abdomen

c. Administer a trial of H_2 blockers

d. Observe the patient and reassure the patient and family

e. Recommend a lactose-free diet

259. The 4-year-old child pictured below is noted to have the tooth decay as shown. This characteristic pattern of tooth decay is caused by which of the following?



- a. Excessive use of fluoride
- b. Tetracycline
- c. Use of bottled water that lacks fluoride
- d. Prolonged use of a baby bottle
- e. Consumption of too much candy

260. A 12-year-old girl was hit in the face by a baseball 15 minutes earlier and has had her mandibular incisors knocked out. Which of the following represents the best plan of action?

- a. The teeth should be rinsed in hot water then carefully dried.
- b. Foreign matter adhering to the teeth should be immediately scrubbed off.
- c. The teeth may be transported in tea, juice, or cola.
- d. Avulsed teeth can be transported in the mouth of the parent or a cooperative patient.
- e. A dental appointment should be made within 48 to 72 hours.

261. A 55-day-old infant born prematurely at 27 weeks of gestation is shown below. The swelling is not tender, firm, hot, or red, and it does not transilluminate. It seems to resolve with pressure, but returns when the infant cries or strains. Which of the following is the most appropriate course of action at this point?



Inguinal hernia

- a. Obtain a surgical consultation
- b. Perform a needle aspiration
- c. Order a barium enema
- d. Order a KUB (plain radiographs of kidney, ureter, and bladder)
- e. Observe the patient and reassure the patient and family

262. An 18-month-old infant is found with the contents of a bottle of drain cleaner in his mouth. Which of the following treatment options is most appropriate?

- a. Immediate emesis
- b. Endoscopic examination within the first 12 to 24 hours
- c. Decontamination by activated charcoal
- d. Neutralization by drinking a solution of the opposite pH
- e. Have the patient drink copious amounts of milk or water

263. A 16-year-old male, despondent over a recent breakup, tries to commit suicide by taking an unknown quantity of an unknown material he found at home. He is brought to the emergency center by his parents within 30 minutes of the ingestion. For which of the following household materials and medications should he be given activated charcoal as part of his emergency center treatment?

- a. Drain cleaner
- b. Ethylene glycol
- c. Bleach
- d. Phenobarbital
- e. Lithium

Questions 264 to 268

For each of the patient descriptions below, choose the best initial diagnostic step in the evaluation of the patient's apparent GI hemorrhage. Each lettered option may be used once, more than once, or not at all.

- a. Abdominal series
 - b. Fiberoptic endoscopy
 - c. Apt test
 - d. Routine stool culture
 - e. Barium enema
 - f. No immediate intervention
 - g. Meckel scan
 - h. Stool culture on sorbitol-MacConkey medium
- 264-c, 265-a, 266-h, 267-f, 268-b.**

264. A newborn infant, the product of an emergency cesarean section, is 24 hours old and has a grossly bloody stool. She looks well otherwise.

265. A 7-day-old premature infant born at 26 weeks of gestation now has a grossly bloody stool, abdominal distention, and increasing oxygen requirements.

266. A 2-year-old has crampy abdominal pain and grossly bloody diarrheal stool, but no fever. His abdominal examination reveals no masses. A family member, who ate at the same local hamburger shop the night prior, has the same symptoms.

267. A 7-year-old has been vomiting for 2 days and has had diarrhea for 1 day. He now notes that he has small streaks of blood in his emesis. The rest of his family has had similar symptoms.

268. A 10-year-old has complained for 1 month of intermittent epigastric pain that awakens him from sleep. He notes that eating food sometimes helps. He reports black stools during the prior week, and also admits that he has occasionally vomited frank blood.

Questions 269 to 274

For each presented child, choose the one most appropriate vitamin or trace element—replacement therapy to treat the described condition. Each lettered option may be used once, more than once, or not at all.

- a. Vitamin A
- b. Vitamin B₆
- c. Vitamin C
- d. Vitamin D
- e. Vitamin E
- f. Iron
- g. Vitamin K
- h. Folate
- i. Niacin

269-b, 270-f, 271-g, 272-c, 273-a, 274-d.

269. A 15-year-old vegetarian being treated for tuberculosis develops peripheral neuropathy.

270. A 9-month-old infant, who has been fed cow's milk exclusively for 4 months, is tachycardic and pale.

271. A 3-day-old infant born at home is brought to the emergency center with bloody stools, hematemesis, and purpura. His circumcision is oozing blood.

272. A 17-month-old toddler has been irritable over the past month. She now refuses to walk and seems to have tenderness in both of her legs. She has had a low-grade fever, and she has petechiae on her skin and mucous membranes. She has a small cut that has not healed well. Radiographs of the legs reveal generalized bony atrophy with epiphyseal separation.

273. A 4-year-old whose diet consists mostly of cheese puffs and cola begins to have problems walking at night, complaining that he cannot see well. In addition, his skin has become dry and scaly, and he has complained of headache for a month.

274. An exclusively breast-fed 2-year-old is brought to the emergency center with pain in his right leg after a fall. Physical examination reveals a small child with a 3-cm anterior fontanelle, a flattened occiput, a prominent forehead, significant dental caries, bumpy ribs, and bowed extremities. Radiographs reveal a greenstick fracture at the site of pain, along with fraying at the distal ends of the femur.

Questions 275 to 277

275-e, 276-c, 277-b

For each description of symptoms below, select the study which is most likely to be diagnostic. Each lettered option may be used once, more than once, or not at all.

- a. Esophageal manometry
- b. 24-hour pH probe
- c. Upper GI endoscopy
- d. Upper GI fluoroscopy (upper GI series)
- e. Modified barium swallow

275. A 3-week-old child currently admitted to the hospital for pneumonia who gags and chokes during feedings

276. A 12-year-old who has several weeks of abdominal pain and black stools

277. A newborn with arching of the back temporally related to feeds but no emesis

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Answers

235. The answer is b. (*Hay et al*, pp 612-613, 629-630. *Kliegman et al*, pp 1565-1567. *McMillan et al*, pp 373-375, 1920-1923. *Rudolph et al*, pp 1368-1370, 1461-1463.) The radiograph demonstrates a stool-filled megacolon. Finding a dilated, stool-filled anal canal with poor tone on the physical examination of a well-grown child supports the diagnosis of functional constipation. Hirschsprung disease is usually suspected in the chronically constipated child despite 98% of such children having functional constipation. The difficulty in treating functional constipation, once it has been established as the diagnosis, emphasizes the need for prompt identification and treatment of problems with defecation and for counseling of parents regarding proper toileting behavior. An extensive workup of this patient would likely be negative and expensive, and is not indicated. Hirschsprung usually presents in infancy with increasingly difficult defecation in the first few weeks of life. Typically no stool is found in the rectum, and anal sphincter tone is abnormal. Diagnosis of Hirschsprung disease may be made with rectal manometry and rectal biopsy.

236. The answer is a. (*Hay et al*, pp 608-609. *Kliegman et al*, pp 1572-1574. *McMillan et al*, pp 1932-1937. *Rudolph et al*, pp 1433-1434.) The presence of nocturnal abdominal pain and GI bleeding in a patient with a positive family history support a diagnosis of peptic ulcer disease (PUD). Pain is the most common symptom. Symptoms often persist for several years before diagnosis. The increased incidence of peptic ulcer disease in families (25%-50%) and concordance in monozygotic twins suggest a genetic basis for the disease. Diagnosis may be made conclusively with endoscopy; stains and cultures obtained during endoscopy can diagnose PUD caused by *Helicobacter pylori*. Serum testing for *H pylori* is controversial, and typically does not distinguish between acute and past infection; the urea breath test may turn out to be more reliable than the serum assay, and is becoming more available. The mainstay of treatment is acid blockade. Antibiotic treatment for *H pylori* can cure this disease in infected patients, although the

optimal combination of medications is still unclear. Appendicitis is an acute event. Pinworms produce perianal pruritus but do not commonly cause abdominal pain or other serious problems. Meckel diverticulum causes painless rectal bleeding, usually during early childhood. Functional, or recurrent, abdominal pain is a benign, self-limited diagnosis of exclusion; GI bleeding is not a typical finding.

237. The answer is a. (Kliegman *et al*, pp 1550-1551. McMillan *et al*, pp 1986-1988. Rudolph *et al*, pp 1396-1397.) Information about eosinophilic esophagitis continues to evolve, but it appears to be an allergic response. Males are affected more than females. The history usually includes atopy or food allergy. Symptoms are similar to those seen in gastroesophageal reflux disease, but are not relieved with acid blockade. Some have elevated IgE levels or peripheral eosinophilia (hinted at by his history of eczema and peanut allergy). Endoscopy reveals mucosal furrowing; strictures can develop as well. Biopsy reveals many eosinophils (normal mucosa does not have eosinophils). Treatment includes avoidance of specific food allergens. Inhaled or systemic steroids have been helpful. Candidal or *Aspergillus* esophagitis is usually seen in immunocompromised individuals, and thus would be unlikely in this patient. Observation would not be helpful in this case.

238. The answer is c. (Hay *et al*, pp 610-611. Kliegman *et al*, pp 1561-1562. McMillan *et al*, p 372. Rudolph *et al*, pp 1400-1402.) The plain films demonstrate dilated stomach and proximal loops of bowel. The cross-table upper GI demonstrates a "curly Q" twist of barium as it passes through the malrotated portion of bowel. Malrotation results when incomplete rotation of the intestines occurs during embryologic development. The most common type of malrotation is failure of the cecum to move to its correct location in the right lower quadrant. Most patients present in the first weeks of life with bilious vomiting indicative of bowel obstruction and/or intermittent abdominal pain. Acute presentation, similar to that in the question, is caused by a volvulus of the intestines. The diagnosis is confirmed by radiographs; barium contrast studies (upper GI and/or enema) demonstrate malposition of the cecum in the vast majority of cases. Treatment is surgical. Appendicitis is rare at this age and presents as an acute, rigid abdomen and signs of sepsis. Pyloric stenosis usually does not occur until after 3 weeks of life and presents with nonbilious vomiting. If the child were 6 months or older, intussusception would be higher on the differential, but it is an unusual condition for this age. Jejunal atresia would have been noted on

the first day of life, as the patient would not have tolerated any feeds prior to newborn discharge.

239. The answer is b. (*Hay et al, pp 507-508. Kliegman et al, p 754. McMillan et al, p 1428. Rudolph et al, pp 1968, 1977-1978.*) The radiographs are consistent with meconium ileus, a condition virtually pathognomonic for cystic fibrosis (CF). Approximately 15% of children with CF will present with meconium ileus. Echogenic bowel on prenatal ultrasound can be an early hint. Inspissated meconium obstructs the small bowel, usually at the level of the terminal ileum. Radiographs show dilated loops of bowel, and usually reveal a bubbly or granular pattern at the level of obstruction. The enema shows microcolon from disuse. Complications of meconium ileus may include perforation and meconium peritonitis. Meconium ileus should be distinguished from meconium plug, which is more commonly seen and is not as predictive of CF.

240. The answer is a. (*Hay et al, pp 633-637. Kliegman et al, pp 1575-1585. McMillan et al, pp 1954-1972. Rudolph et al, pp 1435-1444.*) The patient in the vignette has ulcerative colitis, a chronic inflammatory condition usually involving the entire colon. While there does seem to be some genetic predisposition (twin concordance is 16%, while twin concordance for Crohn disease is 36%), inheritance is not clearly dominant or recessive. Patients usually have intermittent symptoms of bloody diarrhea, and can have abdominal pain and growth failure. Perianal disease is uncommon, as are mouth ulcerations. So-called skip areas, portions of the intestine free of disease, are common in Crohn disease, but are not seen in ulcerative colitis. ASCA is positive in about 55% of those with Crohn disease, but are uncommon in ulcerative colitis; conversely, p-ANCA is positive in about 70% of patients with ulcerative colitis, but in less than 20% of patients with Crohn disease. The most serious complication of ulcerative colitis is toxic megacolon, a medical and surgical emergency in which patients develop fever, tachycardia, dehydration, leukocytosis, and electrolyte abnormalities associated with a markedly dilated colon. This complication comes with a high risk of intestinal perforation. Patients with ulcerative colitis have a markedly elevated risk of colonic carcinoma; after 10 years of disease, the annual cumulative risk is 0.5% to 1% a year. Strictures are more common in Crohn disease and are unusual in ulcerative colitis.

241. The answer is b. (*Hay et al, pp 612-613. Kliegman et al, pp 1565-1567. McMillan et al, pp 373-375. Rudolph et al, pp 1461-1463.*) The diagnosis of

Hirschsprung disease should be suspected in a child with intractable chronic constipation without fecal soiling (although approximately 3% do have soiling). In contrast, overflow diarrhea caused by leakage of the unformed fecal stream around a rectal impaction is common in functional constipation. A neonatal history of delayed passage of meconium is often obtained, and the infant can continue to be constipated and to have bouts of abdominal distention and vomiting. The infant is also at risk of developing enterocolitis, a life-threatening consequence of the partial obstruction. Radiologic study by barium enema and rectal manometry are accurate diagnostic tools. Identification of an aganglionic segment of bowel by punch or suction biopsy can establish the diagnosis. Histochemical tissue examination showing increased amounts of acetylcholinesterase and an absence of ganglia cells is confirmatory. Rectal manometric studies have shown that in aganglionic megacolon, the usual relaxation of the internal rectal sphincter in response to balloon inflation does not occur. Surgery is indicated as soon as the diagnosis is made. Antispasmodic agents and dietary changes are not helpful, and a plain film of the abdomen would not confirm the diagnosis.

242. The answer is a. (*Hay et al, pp 607-608. Kliegman et al, pp 1555-1557. McMillan et al, pp 371-372. Rudolph et al, p 1402.*) A history of nonbilious vomiting for 10 days in a child of this age who does not look ill points to infantile hypertrophic pyloric stenosis as the most likely diagnosis; surgical consultation for a likely pyloromyotomy is indicated. The ultrasound in the question demonstrates the thickened pylorus. The incidence of this condition in infants is between 1:200 and 1:750, with males affected more often than females. Although there is no specific pattern of inheritance, a familial incidence has been observed in about 15% of patients. Information about predisposing ancestry is conflicting, as are data concerning the assertion of a firstborn predilection. Metabolic alkalosis with low serum potassium and chloride levels is frequently seen in pyloric stenosis as a result of loss of gastric contents from vomiting. A child with a small-bowel obstruction (who may require an upper GI with small-bowel follow through to help diagnose the point of obstruction) should develop bilious emesis and should not look well 10 days into the illness; similarly, a child with intussusception (who requires an air contrast enema, which is both diagnostic and perhaps therapeutic) would be markedly ill at this point. Gastroenteritis (IV fluids alone to maintain hydration) does not usually last for 10 days. A brain tumor causing increased intracranial pressure could present with isolated emesis, but should show other symptoms such as irritability and somnolence.

243. The answer is c. (Hay et al, pp 670-671. Kliegman et al, pp 1708-1709. McMillan et al, pp 2042-2045. Rudolph et al, pp 1507-1508.) Cholecystitis and cholelithiasis are unusual diseases in children and are almost always associated with predisposing disorders such as hemolytic anemia, pregnancy, cystic fibrosis, Crohn disease, obesity, rapid weight loss, or prior ileal resection. Pain of the right upper quadrant, nausea, vomiting, fever, and jaundice are symptoms of acute cholecystitis. The diagnosis is confirmed with an ultrasound of the gallbladder. While some of the other answers listed might result in abnormalities, the findings would be neither sensitive nor specific for cholecystitis. Thus, the diagnostic test of choice is an ultrasound.

244. The answer is a. (Hay et al, pp 676-677. Kliegman et al, pp 1653-1655. McMillan et al, pp 1210-1211. Rudolph et al, pp 1466-1467.) While no diagnostic test is completely accurate, an elevated total serum amylase with the correct clinical history and signs and symptoms of pancreatitis is the best diagnostic tool. The causes of pancreatitis in children are varied, with about one-fourth of cases without predisposing etiology and about one-third of cases as a feature of another systemic disease. Traumatic cases are usually due to blunt trauma to the abdomen. Acute pancreatitis is difficult to diagnose; a high index of suspicion is necessary. Common clinical features include severe pain with nausea and vomiting. Tenderness, guarding or rebound pain, abdominal distention, and a paralytic ileus are often seen. Plain films of the abdomen may exclude other diagnoses; ultrasonography of the pancreas can reveal enlargement of the pancreas, gallstones, cysts, and pseudocysts. Supportive care is indicated until the condition resolves.

245. The answer is c. (Hay et al, pp 616-617. Kliegman et al, pp 1569-1570. McMillan et al, pp 1938-1940. Rudolph et al, pp 1407-1408.) The usual presentation of intussusception is that of an infant between 4 and 10 months of age who has a sudden onset of intermittent colicky abdominal pain. The child can appear normal when the pain abates, but as it recurs with increasing frequency, the child can begin to vomit and become progressively more obtunded. The passage of stool containing blood and mucus, frequently described as resembling currant jelly, is often observed. Early examination of the abdomen can be unremarkable, but as the problem persists, a sausage-shaped mass in the right upper quadrant is frequently palpated. An air, barium, or saline enema examination under fluoroscopic or ultrasound control can be therapeutic as well as diagnostic when the hydrostatic effects of the contrast serve to reduce the intussusception, but should be performed with

surgical backup, as a complication of attempted reduction is intestinal perforation. Rates of intestinal perforation are lowest with air reduction. Early diagnosis prevents bowel ischemia. The cause of most intussusceptions is unknown, but a Meckel diverticulum or polyp can serve as a lead point. None of the other choices would result in a correct diagnosis (and potential therapy) for the child with a classic presentation for intussusception.

246. The answer is d. (*Hay et al, pp 605-606. Kliegman et al, pp 1547-1550. McMillan et al, pp 382-384. Rudolph et al, pp 1389-1393.*) Gastroesophageal reflux is a common pediatric complaint, often seen in the first 1 to 2 months of life and resolving by 1 to 2 years of age. Occasional episodes of gastroesophageal reflux in infancy are physiologic; gastroesophageal reflux disease is the pathologic form, involving respiratory symptoms, esophagitis, related apnea, or weight loss. About 7% of children have reflux severe enough to require medical attention, and only 2% of that group requires investigation. For children who are growing well and do not have respiratory symptoms attributed to reflux, conservative treatment (small feeds, thickened formula, avoiding high-fat meals and overfeeding, etc) suffices. A small number need pharmacologic therapy. Medications to treat GERD include acid blockade with H₂ blockers or proton pump inhibitors, resulting in decreased esophagitis. Prokinetic agents are frequently used in conjunction with acid blockade for this illness, but have not been consistently shown to decrease symptoms.

Pyloric stenosis presents with nonbilious vomiting in the first weeks of life and not at 12 months of age. Similarly, a patient with a partial duodenal atresia would be noted in the newborn period, likely with bilious vomiting. Hypothyroidism can cause constipation, among other findings, but a presentation with isolated vomiting would be distinctly unusual. A 12-month-old patient with a tracheoesophageal fistula would likely have an "H-type" fistula, which presents with ongoing respiratory issues and not emesis.

247. The answer is c. (*Hay et al, pp 633-637. Kliegman et al, pp 1580-1585. McMillan et al, pp 1962-1972. Rudolph et al, pp 1441-1444.*) The presentation of Crohn disease depends on the location and extent of lesions. Onset of the GI or extraintestinal symptoms is insidious. The common presentation is as described. Crohn disease (granulomatous colitis) characteristically is associated with transmural, granulomatous intestinal lesions that are discontinuous and can appear in both the small and large intestines. Although Crohn disease can first appear as a rectal fissure or fistula, the rectum is often spared. Arthritis/arthritis occurs in a minority (11%) of affected children.

Other extraintestinal symptoms include erythema nodosum or pyoderma gangrenosum, liver disease, renal calculi, uveitis, anemia, specific nutrient deficiency, and growth failure. In relation to the general population, the risk of colonic carcinoma in affected persons is increased, but not nearly to the degree associated with ulcerative colitis.

248. The answer is e. (Hay et al, pp 1227-1229. Kliegman et al, pp 1083-1084, 1462-1464. McMillan et al, pp 680-684, 1329-1331. Rudolph et al, pp 521-522, 1131-1132.) Parasites are a common medical problem, found in about 60% of international adoptees, in most cases related to tainted water ingestion; *Giardia* is the most frequent isolate. Patients with *Giardia* infection complain of recurrent abdominal pain, cramping, intermittent diarrhea, bloating, and weight loss. Although many cases are self-limited, symptoms can recur or become chronic. Identifying the *Giardia* cysts or trophozoites makes the diagnosis. Upper endoscopy and microscopic examination of duodenal biopsies can also be diagnostic. Although international adoptees may also have hepatitis, it is much less common than parasitic infection. Most patients with *Giardia* infection have normal CBCs. An upper GI series may reveal nonspecific changes associated with *Giardia* infection, but an ultrasound would not be helpful. An ESR is merely a nonspecific marker for inflammation, and would not help make the diagnosis.

249. The answer is d. (Hay et al, pp 605-606. Kliegman et al, pp 1547-1550. McMillan et al, pp 382-383. Rudolph et al, pp 1390-1393.) Barium swallow and upper GI series are helpful in detecting anatomic abnormalities such as antral web, pyloric stenosis, malrotation, and annular pancreas. To confirm the presence of gastroesophageal reflux (GER), the best test is the esophageal pH probe, which measures the frequency and duration of falls in pH, thereby indicating acid reflux. Esophageal manometry is used to identify poor tone of the lower esophageal sphincter. In this child, who is growing well and developing properly and has no other medical problems such as reflux-induced apnea or bradycardia or aspiration pneumonia, pharmacologic treatment is not necessary, as most infants will outgrow this common problem of esophageal reflux. Surgical correction is reserved for infants with poor weight gain or reflux-associated apnea and bradycardia who have failed pharmacologic therapy.

250. The answer is d. (Hay et al, pp 611-612. Kliegman et al, p 1563. McMillan et al, pp 372-373. Rudolph et al, pp 1405-1406.) The child described

has a typical presentation for Meckel diverticulum. The embryonic duct connecting the yolk sac to the intestine can fail to regress completely and persist as a diverticulum attached to the ileum. It is common, occurring in 1.5% of the population; however, it rarely causes symptoms. Children symptomatic with this condition usually present with painless rectal bleeding in the first 2 years of life, but they can have symptoms throughout the first decade. The lining of the Meckel diverticulum usually contains acid-secreting gastric mucosa that can produce ulcerations of the diverticulum itself or the adjacent ileum. Bleeding, perforation, or diverticulitis can occur. More seriously, the diverticulum can lead to volvulus of itself and of the small intestine, and it can also undergo eversion and intussusception. Diagnosis can be made by technetium scan that labels gastric mucosa, and treatment is surgical excision. Barium studies do not readily reveal the diverticulum, nor do plain films.

251. The answer is b. (*Hay et al*, pp 626-627. *Kliegman et al*, p 1598. *McMillan et al*, p 1978. *Rudolph et al*, p 1424.) Lactase is a disaccharidase localized in the brush border of the intestinal villous cells. It hydrolyzes lactose to its constituent monosaccharides, glucose, and galactose. Intestinal lactase levels are usually normal at birth in all populations; however, lactase deficiency is a common, genetically predetermined condition. Lactase activity is not readily increased by the oral administration of substrate or the inclusion of lactose in the diet. The clinical symptoms of lactose malabsorption are due to the presence of osmotically active, undigested lactose, which may act to increase intestinal fluid volume, alter transit time, and produce the symptoms of abdominal cramps, distention, and occasionally, watery diarrhea. Bacterial metabolism of the nonabsorbed carbohydrates in the colon into carbon dioxide and hydrogen may contribute to the clinical symptoms. Acquired lactase deficiency is often associated with conditions of the GI tract that cause intestinal mucosal injury (eg, sprue and regional enteritis). Diagnostic techniques for lactose intolerance include removal of the offending sugar, with a reproduction of symptoms upon reintroduction. Although the ingestion of even small amounts of lactose can be diagnostic if GI symptoms occur, the measurement of breath hydrogen is more specific, as it is not affected by glucose metabolism or gastric emptying. Similarly, an acidic stool pH in the presence of reducing substances would be diagnostic.

252. The answer is b. (*Hay et al*, p 648. *Kliegman et al*, p 1705. *McMillan et al*, pp 2034-2035. *Rudolph et al*, p 1482.) Obstructive jaundice (ie, direct-reacting

bilirubin greater than 20% of the total) requires investigation in all infants. Cystic fibrosis and α_1 -antitrypsin deficiency should be considered in the diagnostic evaluation of any child with obstructive jaundice. Other diseases to be excluded are galactosemia, tyrosinemia, and urinary tract or other infections (including toxoplasmosis, cytomegalovirus, rubella, syphilis, and herpesvirus). Ultrasound examination to rule out choledochal cyst may be included with a technetium ^{99m}Tc hepatic iminodiacetic acid (HIDA) scan to assess the patency of the biliary tree. Liver biopsy can assist in the diagnosis by providing a histologic diagnosis (eg, hepatitis, biliary atresia), tissue for enzyme activity (ie, inborn error of metabolism), or tissue for microscopic determination of storage diseases. ABO and Rh incompatibility occasionally cause direct hyperbilirubinemia if there were brisk hemolysis at birth, which would then lead to inspissated bile syndrome. All of the other causes listed typically lead to indirect hyperbilirubinemia.

253. The answer is d. (*Hay et al, p 617. Kliegman et al, p 1552. Rudolph et al, pp 1397-1398.*) In patients without respiratory symptoms, observation for 24 hours of some foreign bodies in the esophagus can be effected; the foreign body usually passes uneventfully into the stomach. However, button batteries that lodge in the esophagus must be removed urgently via endoscopy as they carry a high risk of esophageal perforation in as little as 1 hour. Patients who have stridor associated with external compression of the airway also need emergent intervention. Some advocate removing esophageal foreign bodies using a balloon catheter (passing the catheter past the foreign body, inflating the balloon, and pulling both the catheter and the object out). However, this does not allow direct visualization of the mucosa to determine the extent of the injury and also carries the risk of aspiration; it should be performed only by experienced personnel.

254. The answer is c. (*Hay et al, p 1278. Kliegman et al, p 313. McMillan et al, p 63. Rudolph et al, p 1645.*) A moribund state is characteristic of a loss of greater than 10% of body weight from dehydration. The other findings are characteristic of a loss of body weight of 5% to 9% when there is no hypernatremia. Additional findings at this level of dehydration can be restlessness, absent or reduced tears, weak radial pulses, and possibly orthostatic hypotension.

255. The answer is c. (*Hay et al, pp 1279-1280. Kliegman et al, pp 313-316. McMillan et al, pp 63-66. Rudolph et al, pp 1644-1646, 1650-1652.*) The

description is that of a child with hypernatremia (in this case, the child's sodium was 170 mEq/dL); the "doughy" skin is often seen in hypernatremia. The extracellular fluid and circulating blood volumes tend to be preserved with hypernatremic dehydration at the expense of the intracellular volume. Therefore, hypotension may not be observed, nor may the other signs of circulatory inadequacy that are typical of isotonic or hypotonic dehydration. Signs suggesting involvement of the central nervous system (such as irritability or lethargy) are characteristic of hypotonic dehydration. Isotonic saline is the best fluid for an initial bolus in a patient such as the one described in the question.

Use of $\frac{1}{4}$ normal saline (38.5 mEq sodium/L) or D10 water (100 g glucose/L) in this dehydrated child would not expand the intravascular space and its hyponatremic nature might lead to cerebral edema. The child in the question is hypernatremic, so 3% saline (513 mEq sodium/L) would only exacerbate the problem; its use in dehydration might be considered for some patients with severe hyponatremia. Fresh-frozen plasma can be used in the situation described, but it is generally not rapidly available, is more expensive, can be associated with infectious agents, and offers no advantage to saline.

256. The answer is a. (Hay et al, pp 1276-1280. Kliegman et al, pp 313-316. McMillan et al, pp 63-66. Rudolph et al, pp 1644-1646, 1650-1652.) Initial bolus therapy in the emergency center should have been with isotonic fluid such as normal saline or lactated Ringer solution. Slow correction of this hypernatremia (more than 24-48 hours) prevents significant fluid shifts and increased intracranial pressure. Hyperglycemia may be seen in hypernatremic dehydration because of decreased insulin secretion and cell sensitivity to insulin; this is particularly important to recognize because increased serum glucose can cause the serum sodium to be falsely decreased. Blood products such as fresh-frozen plasma are not indicated, and rapid infusion of hypotonic solutions such as D10W and $\frac{1}{4}$ normal saline could cause rapid fluid shifts resulting in cerebral edema and death. Hypertonic (3%) saline is used only in the event of seizures caused by rapid rehydration (or in children with hyponatremic dehydration and associated central nervous system symptoms), along with other emergent measures typically used to reduce cerebral edema.

257. The answer is a. (Hay et al, pp 451-453. Kliegman et al, p 1205. Rudolph et al, p 1285.) In general, mandibular teeth erupt before maxillary teeth; teeth tend to erupt in girls before they do in boys. The first teeth to erupt usually are

the mandibular central incisors at 5 to 7 months, followed by the maxillary central incisors at 6 to 8 months. Lateral incisors (mandibular then maxillary) erupt next at 7 to 11 months, followed by the first molars (10-16 months), the cuspids (16-20 months), and the second molars (20-30 months).

258. The answer is d. (*Hay et al*, pp 631-633. *Kliegman et al*, pp 1627-1628. *McMillan et al*, pp 1977-1979. *Rudolph et al*, pp 1357-1363.) Recurrent abdominal pain is a common complaint occurring in at least 10% of school-age children. In children older than 2 years, less than 10% of cases have an identifiable organic cause. Management of these children is difficult and frustrating for the physician and the family. Excessive testing and treatments are not typically useful. A thorough history and physical examination, including growth parameters, are frequently helpful in separating organic from nonorganic causes of abdominal pain. Any signs or symptoms of organic causes, such as growth failure, should be pursued. If nothing in the history or physical examination is found, as is likely in the case described, reassurance of the children and family members is indicated. Close follow-up for new or changing symptoms as well as further reassurance to the family is important.

259. The answer is d. (*Hay et al*, pp 453-454. *Kliegman et al*, pp 1534-1536. *McMillan et al*, p 795. *Rudolph et al*, pp 1288-1290.) The pattern of dental disease found with the use of bottles that contain high concentrations of sugars, which promotes dental disease, includes extensive maxillary decay (especially frontal) and posterior maxillary and mandibular decay, but essentially normal mandibular frontal teeth. Prevention of this disease is possible through counseling families to avoid the use of fruit juices in bottles or sweetened pacifiers. In addition, children should not be permitted to take a bottle to bed with them; weaning from the bottle should be discussed with the parents toward the end of the first year of life. Genetic predisposition seems to play a role as well.

260. The answer is d. (*Hay et al*, pp 455-456. *Kliegman et al*, pp 1537-1538. *McMillan et al*, p 798. *Rudolph et al*, pp 1303-1304.) The earlier that permanent teeth are replanted, the greater the rate of success, decreasing from 90% in the first 30 minutes to 5% after 2 hours. The rate of success is a function of the integrity of the periodontal ligament. The teeth can be rinsed in cold water, but not brushed (to avoid damaging the root and periodontal ligament). Milk or saline are good transport media if the child is uncooperative or for some other reason the teeth cannot be reinserted at the scene. Teeth may also be transported in the mouth of the older, cooperative patient

or the parent. The immediate application of acrylic splints is needed to keep the teeth in place, so immediate dental attention is required. The need for full tetanus immunization should be evaluated. Unless the tooth is available, patients who are suspected of having a total avulsion should be evaluated for partial avulsion or total intrusion with a radiograph. A completely avulsed primary tooth is generally not replaced, to avoid damage to the underlying permanent tooth.

261. The answer is a. (*Hay et al, p 618. Kliegman et al, pp 1644-1650. McMillan et al, pp 1925-1927. Rudolph et al, p 1742.*) A congenital indirect inguinal hernia is the result of a patent processus vaginalis. This is in contrast to the less common acquired direct inguinal hernia, caused by weakness in the musculature of the inguinal canal. Inguinal hernias are commonly seen in premature infants (16%-25%). Incarceration is common; elective repair is often considered prior to hospital discharge. The diagnosis is so common that diagnostic tests are performed infrequently.

262. The answer is b. (*Hay et al, pp 344-345, 607. Kliegman et al, pp 352-353. McMillan et al, p 750. Rudolph et al, pp 1395-1396.*) Endoscopic examination of the esophagus and stomach is a diagnostic method of determining the extent of the mucosal injury. Vomiting is to be avoided since it would expose the mucosal surfaces to the caustic agent a second time. The child can be given small amounts of milk or water, but large amounts, which might cause vomiting, are unwise. Neutralization of the caustic can result in an exothermic reaction and produce a thermal burn. The use of steroids after endoscopy in second-degree chemical burns of the esophagus has been effective in diminishing the inflammatory response in some patients. Optimal treatment is still controversial and requires expert consultation or review of the most current literature. Charcoal, however, does not absorb the alkaline agent in drain cleaner.

263. The answer is d. (*Hay et al, p 338. Kliegman et al, p 344. McMillan et al, p 750. Rudolph et al, p 359.*) The absorption of certain toxins from the GI tract is diminished by the use of activated charcoal administered during the first few hours after the ingestion in the minimum dose of 10 to 30 g for a child or 30 to 100 g for an adult. Activated charcoal exerts its effect by adsorbing particles of toxin on its surface. Compounds not adsorbed include alcohols, acids, ferrous sulfate, strong bases (such as drain cleaners and oven cleaners), cyanide, lithium, and potassium. For drugs with an

enterohepatic circulation (eg, phenobarbital and tricyclic antidepressants), or those with prolonged absorption (eg, sustained-release theophylline), the use of multiple-dose activated charcoal can be effective in decreasing the half-life and increasing the total body clearance of the toxic substance.

264 to 268. The answers are 264-c, 265-a, 266-h, 267-f, 268-b. (Hay *et al*, pp 38-39, 48, 608-609, 1178-1180. Kliegman *et al*, pp 755-756, 774 1195, 1527-1528, 1572-1574. McMillan *et al*, pp 389-397, 443, 1066-1067, 1930, 1932-1937. Rudolph *et al*, pp 140-143, 987, 1372, 1432-1434.) Swallowed maternal blood can be differentiated from neonatal hemorrhage by the Apt test, which distinguishes fetal hemoglobin from adult hemoglobin based on the specimen's reaction to alkali (fetal hemoglobin is unchanged, whereas adult hemoglobin changes to hematin). Infants may swallow blood during delivery or from a cracked nipple during breast-feeding.

Necrotizing enterocolitis is a life-threatening condition seen mostly in premature infants. Although the precise etiology is unknown, contributing factors include GI tract ischemia, impaired host immunity, the presence of bacterial or viral pathogens, and the presence of breast milk or formula in the gut. Findings include bloody stools, abdominal distension, hypoxia, acidosis, and emesis. The initial diagnostic test of choice is plain film radiographs. The characteristic finding in necrotizing enterocolitis (NEC) is pneumatosis intestinalis; free air in the peritoneum may also be seen. Perforation is a surgical emergency, otherwise observation and antibiotics are indicated.

Enterohemorrhagic *Escherichia coli* are pathogens found in poorly cooked beef, and some have been responsible for outbreaks of bloody diarrhea that were well-publicized in the media. These organisms secrete shiga toxin. Routine stool cultures do not isolate this particular pathogen; the laboratory must use sorbitol-MacConkey agar to isolate the bacteria. Enzyme assays for shiga toxin are becoming available as well.

Forceful emesis can result in small tears in the esophagus, termed Mallory-Weiss syndrome. This is usually a benign condition, only occasionally resulting in significant blood loss. In a patient who is otherwise stable, diagnostic procedures are not indicated.

Peptic ulcer disease can result in hematemesis and melena, along with the typically epigastric abdominal pain. Children can have both chronic and acute blood loss associated with ulceration. Fiberoptic endoscopy is the diagnostic method of choice. An upper GI series can sometimes reveal an ulcer as well. While *H pylori* serum assays are available, they have limited usefulness in children.

269 to 274. The answers are 269-b, 270-f, 271-g, 272-c, 273-a, 274-d.

(Hay et al, pp 294-299. Kliegman et al, pp 242-264. McMillan et al, pp 113-114. Rudolph et al, pp 1322-1326.) Treatment for tuberculosis usually includes the medication isoniazid (INH), and INH competitively inhibits pyridoxine utilization. In most children, this does not result in clinical manifestations, but in individuals with a poor dietary intake of pyridoxine (eg, teenagers, vegetarians, and exclusively breast-fed infants) numbness and tingling of the hands and feet may develop. Treatment is replacement of pyridoxine.

Cow's milk contains an insufficient quantity of iron to sustain normal RBC production. Therefore, children whose primary caloric source is cow's milk are likely to develop iron-deficiency anemia, characterized by microcytosis and hypochromia on the peripheral smear.

Hemorrhagic disease of the newborn is now rare, as the vast majority of newborns receive a vitamin K injection shortly after birth. Classic disease presents within the first week of life and is characterized by hematemesis, hematuria, umbilical stump and circumcision oozing, and purpura.

Vitamin C deficiency impairs wound healing. In its severe form, also termed *scurvy*, children can have diffuse tenderness, which is worse in the legs; evidence of hemorrhage; irritability; low-grade fever; swelling; tachypnea; and poor appetite. Diagnosis is based on clinical picture and radiographic findings; there are no definitive laboratory studies.

Vitamin A deficiency manifests first in visual changes, including night blindness. Deficiency can also cause drying of the conjunctivas and sclera. Skin is frequently dry. Poor growth and impaired cognition are also seen.

Vitamin D deficiency leads to rickets, a failure of bone mineralization, and the clinical picture described in the question. Vitamin D deficiency is usually not a problem in developed parts of the world. In addition to nutritional rickets, there are congenital forms of rickets. Despite vitamin D supplementation, these children can have permanent bony disfigurement.

275 to 277. The answers are 275-e, 276-c, 277-b.

(Hay et al, pp 496, 605, 608-609. Kliegman et al, pp 1547, 1572-1574, 1732-1733. McMillan et al, pp 383, 721, 1932-1937. Rudolph et al, pp 1274, 1390, 1392, 1433-1434.) An infant who gags and chokes while feeding may have an uncoordinated suck-swallow reflex, or may have significant gastroesophageal reflux. More rarely there may be an H-type tracheoesophageal fistula. A modified barium swallow with fluoroscopy allows direct visualization of the swallow reflex. In some situations during the modified barium swallow, the patient may be given different consistencies of food to document if thickened feeds

decrease the dysphasia. A normal barium study does not, however, rule out a fistula.

The second patient's story is concerning for peptic ulcer disease. An upper GI series may show findings suggestive of the diagnosis, but endoscopy is the preferred diagnostic method, as it allows biopsy for microscopy and culture, and direct visualization.

The third child may have gastroesophageal reflux, causing Sandifer syndrome, a condition in which infants will arch and become tonic to protect their airway from the refluxing gastric contents. While an upper GI series can sometime diagnose gastroesophageal reflux, esophageal pH probe is currently the preferred diagnostic test.